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Directed self-assembly of π-conjugated oligopeptides for supramolecular electronics. BO LI, SONGSONG LI, YUECHENG ZHOU, University of Illinois at UrbanaChampaign, JOHN TOVAR, Johns Hopkins University, WILLIAM WILSON, Harvard University, CHARLES SCHROEDER, University of Illinois at UrbanaChampaign — The directed mesoscale engineering of nanoscale building blocks holds enormous promise to catalyze a revolution in new functional materials for advanced electronics. Bio-inspired systems can play a key role in this effort due to their inherent "programmable" function. In this work, oligopeptide with defined flanking sequences was appended to π-conjugated units, thereby directing their assembly processes in a designed manner. By utilizing custom-designed microfluidic devices and controlled acid vapor diffusion, the self-assembly rate was directed and precisely tuned. Notably, the kinetics was found to play a key role in the morphology of self-assembled π-conjugated oligopeptides. The influence of flanking peptide sequences and π-conjugated core-core interactions on the self-assembly nanostructure was systematically investigated. Importantly, the electronic properties of the synthetic peptide assembly was explored by integration as the active layer of a field effect transistor. The presented study offers insights to the design and fabrication of supramolecular electronics.

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